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ABSTRACT

The effects of higher requirements for high school graduation on patterns of participation in secondary education among high school graduates and different patterns of course-taking among college-bound and non-college-bound students from 1969 to 1987 were studied. Data sets were from four national studies on high school students: (1) the Educational Testing Service's Study of Academic Prediction and Growth (1969); (2) the National Longitudinal Survey of Labor Force Experience--Youth Cohort (1975-82); (3) the High School and Beyond Study (1982); and (4) the National Assessment of Educational Progress Transcript Study (1987). Each data set contained complete transcripts for a sample of students. A taxonomy of secondary courses was applied to the transcript files for college-bound and non-college-bound students. Policy efforts to raise high school graduation requirements appear to have resulted in greater average course loads among high school graduates, and more course work in mathematics, science, and foreign languages. More students in 1987 indicated that they planned to go to college than did those in 1982. However, non-college-bound students did not complete more advanced mathematics and science credits in 1987 than in 1982 or 1969. The students most responsive to educational reforms were those who planned to go to college; those planning to enter the labor force were not experiencing the same benefits. An outline of the secondary school taxonomy and seven data tables are provided. (SLD)

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HIGHER GRADUATION STANDARDS AND THEIR EFFECT ON THE COURSE-TAKING PATTERNS OF COLLEGE- AND NON-COLLEGE-BOUND HIGH SCHOOL GRADUATES, 1969 to 1987

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I. Introduction

Education reform in the United States during the decade of the 1980s has been concerned with the pursuit of "educational excellence." This pursuit has been prompted by a perceived crisis in the American educational system, particularly at the secondary level. Crises in American education are recurring events, and are typically initiated in response to the fear that American preeminence (of one sort or another) is in jeopardy.[1] In the late 1950s, the Soviet launching of the Sputnik satellite alarmed many Americans and was the catalyst for a new emphasis on science and technology education in American schools. The catalyst of the current crisis in education was the eroding economic position of the United States relative to the other major industrial powers. The new emphasis on educational excellence was the means to compete in the global economy. *A Nation at Risk (1983)* put the problem his way:

> Our Nation is at risk. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world. This report is concerned with only one of the many causes and dimensions of the problem, but it is the one that undergirds American prosperity, security, and civility.[2]

Despite the tremendous concern about "educational excellence," what it constitutes and how it is to be achieved has not been clearly specified.[3] Lacking a precise definition and clear set of objectives for achieving educational excellence, the states have largely been left with the task of discovering for themselves what it might be and how they are to get there. In practical terms, one of the primary policy efforts to achieve excellence has been increased high school graduation requirements in mathematics, science, and English. Between 1980 and 1987, at least 45 states either increased their standard graduation requirements or established requirements for the first time in one or more of these subject areas.[4] Since the federal government did not prescribe any specific graduation standards that the states had to meet, the coordinated action by the states is somewhat astonishing. Yet what are these higher graduation requirements intended to accomplish? One would think that some well-defined theory was the basis of this concerted action, particularly given the economic or instrumental emphasis of reform. However, even if one accepts the the legitimacy of emphasizing the economic outcomes to education as the basis for designing reform efforts, the policy of raising graduation requirements in the academic curriculum is curiously disassociated from the stated objectives of that policy—educational excellence.

This paper is presented in two parts. The first part (Sections III and IV) describes the effects of higher graduation requirements on patterns of participation in secondary education

among high school graduates. In particular, it focuses on the different patterns of course taking among college-bound and non-college-bound students from 1969 to 1987. These different educational patterns have typically yielded very different economic outcomes. Our findings show that the effects of higher standards are not the same for students from these different groups. The second part of this paper (Section V) explores the implications of changes in course taking among college- and non-college-bound students in light of the instrumental emphasis of reform. Given the stated objectives of educational excellence, we conclude that the observed changes in course taking among students with different plans after high school are not likely to yield the benefits sought by the advocates of current reform efforts.

II. Data Sources and Methods

Data for the analysis of course-taking patterns among public high school graduates were taken from four national studies of high school students and span the two decades between 1969 and 1987. The data sets are the Educational Testing Service's Study of Academic Prediction and Growth (1969), the National Longitudinal Survey of Labor Force Experience—Youth Cohort (1975-82), High School and Beyond (1982), and the National Assessment of Educational Progress transcript study (1987).[5]

Each of these four data sets contains complete transcripts for a sample of students, and it was these transcript data that were used for this study. To ensure comparability across data sets, a taxonomy of secondary courses was developed and applied to each of the transcript files.[6] The Secondary School Taxonomy organizes high school courses into three broad curricular areas: academic, vocational, and personal use/other. The academic curriculum is composed of mathematics, science, English, social studies, fine arts, and foreign languages. The vocational curriculum contains courses in general labor market skills (such as typing), employability skills and work experience, consumer and homemaking economics, and specific vocational fields (such as business or trades and industry). The personal use curriculum includes such courses as student government, religion, community involvement, and physical education. Within each part of the curriculum the taxonomy further divides courses according to the type of material taught (i.e., English, mathematics, consumer and homemaking economics, business support, and so forth) and, when possible, the level or degree of difficulty of the material taught (i.e., basic, advanced, or honors). An outline of the taxonomy is presented in Appendix 1.

This study examines the course-taking patterns of high school graduates only. The impact of reform on non-graduates is interesting, but difficult to pursue with these data sets. Since the primary sampling unit for High School and Beyond and the National Assessment of Educational Progress was the school, students who had already left school before the tenth grade (HS&B) or eleventh grade (NAEP) were not included in the sample. Therefore, there were too few dropouts to accurately characterize their course-taking patterns. High school graduates were identified using a combination of students' self-reported graduation status, the transcript-reported graduation status, and by the total number of credits completed (in order to prevent incomplete transcripts from contaminating the data).[7]

College-bound and non-college-bound students were identified by their response to either the "plans after high school" variable (ETS, HS&B, and NAEP) or the "postsecondary education plans" variable (NLSY). While many students may alter their plans after completing their secondary education, this variable has proven to be an accurate predictor of college attendance. Furthermore, while students may not do as they initially plan, their behavior in high school is conditioned by expectations for postsecondary education.

Enrollment statistics were generated as a series of cross-tabulation tables. Each of the data sets was run using student weights to ensure that the statistics produced were representative of the population of high school graduates in a given year. However, because of the complex sample designs used to collect the information in these data sets, the tabulation program employed a Taylor Series approximation technique to calculate accurate standard errors. Once the descriptive statistics were generated, comparisons of course-taking patterns in different years were made using student's t-tests for families of pairwise comparisons.[8]

III. General Trends in High School Participation[9]

If one measures the effects of reform in quantitative terms—specifically, more course work in high school—then the reform movement appears to be a success. Between 1969 and 1987, the average number of credits completed by the graduates of American public high schools increased from 20.46 to 22.66 (Table 1).[10] This represents an increase of two full-year courses over the two decades studied. However, while the average number of credits completed by high school graduates has steadily increased since 1969 (the first year for which we have data), most of the growth in credits occurred between 1982 and 1987 and coincides with the period of educational reform.

Table 1
Total Credits Completed and Percentage of Students Participating in the Various High School Curricula, by Year of Graduation

	Total credits	Academic credits	Vocational credits	% who took vocational credits	Personal use/other credits	% who took personal use credits
1987	22.66	15.65	4.53	98.10%	2.49	98.07%
1982	21.47	14.17	4.64	97.77	2.63	98.65
1979-82	21.19	13.90	4.89	97.70	2.40	98.73
1975-78	20.77	13.96	4.50	96.73	2.30	97.25
1969	20.47	14.89	3.67	91.94	1.90	97.53

Although the majority of credits completed by public high school graduates has consistently been in academic subjects, the average number of academic credits completed by high school graduates actually declined slightly between 1969 and 1979-82, from 14.89 to 13.90. Hence, increases in overall credits completed between 1969 and 1982 were due to increases in the number of credits taken in the vocational and personal use curricula. However, between 1979-82 and 1987, the average number of academic credits completed by high school graduates increased from 13.90 to 15.65—the equivalent of one and one-half full-year, one-period courses. Between 1982 and 1987, increases in the overall number of credits completed by public high school graduates were the result of increases in academic subjects.[11]

By contrast to the trends in academic education, the number of credits completed by high school graduates in vocational education increased rapidly between 1969 and 1975-78, from

3.67 to 4.50. The average number of vocational credits completed by graduates peaked in 1979-82, when students took an average of 4.89 credits. Since then, however, the average number of vocational credits completed has been declining: graduates of the class of 1987, for example, completed an average of 4.53 vocational credits. Similarly, the average number of credits completed in the personal use/other curriculum increased from 1.90 in 1969 to 2.63 in 1982; by 1987 the average number of credits completed in this curriculum declined to 2.49.

Participation in the academic curriculum has been universal. This is not surprising, since students have typically been required to meet specific graduation standards whether the state sets them or not. Even after the latest round of increasing requirements for graduation, many local districts continue to set standards in excess of the state requirements. Perhaps more surprising, Table 1 also shows that virtually all students participate in the vocational and personal use curricula. This has been the case since 1969, although vocational participation went up from approximately 92 percent to approximately 97 percent between 1969 and 1975-78.

Trends in the Academic Curriculum

The effect of higher graduation standards on levels of participation in the high school curriculum is illustrated by the data presented in Table 2. Between 1969 and 1982, the intensity of participation in math and science was stable at approximately 2.5 credits in math and 2.25 credits in science. There were slight declines in the average number of English, social studies, and foreign language credits completed by graduates between 1969 and 1975-78, but the patterns of course taking in these subjects showed considerable stability between 1975-78 and 1982. In contrast to this relative stability, there were dramatic increases in the number of credits completed by high school graduates between 1982 and 1987. These increases were concentrated in mathematics (0.46 credits), science (0.40 credits), and foreign languages (0.40 credits). A small (but statistically significant) increase in the number of credits completed was also realized in English (0.11 credits). Such increases in the average number of credits completed are not an unexpected finding, since they are being driven by the increase in graduation requirements. Despite substantial gains in the average number of credits completed in the academic curriculum after 1982, graduates from the class of 1987 were completing more course work than graduates from the class of 1969 only in mathematics, science and fine arts; in English and social studies 1987 graduates completed approximately the same number of credits as 1969 graduates, and the later cohort had still not matched the earlier cohort in the average number of foreign language credits completed.

Table 2
Average Number of Credits Completed in Academic Subjects, by Year of Graduation

	English	Mathe-matics	Calculus & advanced math	Science	Chemistry and physics	Social studies	Fine arts	Foreign language
1987	3.99	3.01	0.77	2.57	0.70	3.21	1.47	1.37
1982	3.87	2.55	0.61	2.17	0.50	3.16	1.46	0.97
1979-82	3.76	2.44	0.53	2.18	0.52	3.12	1.47	0.92
1975-78	3.69	2.35	0.49	2.26	0.52	3.15	1.40	1.11
1969	4.07	2.47	0.54	2.23	0.47	3.39	1.17	1.57

Most of the growth in the number of mathematics credits completed by graduates has been at the less advanced levels. The average 1987 high school graduate completed 0.46 more credits in math than the 1969 graduate, but only one-third of this increase (0.16 credits) was in advanced mathematics courses such as trigonometry, algebra II, and calculus. In science, increases in the average number of credits completed were evenly split between introductory/general science courses (0.2 credits) and chemistry and physics courses (0.2 credits).

Trends in the Vocational Curriculum

Total credits completed in the vocational curriculum increased rapidly between 1969 and 1979-82, and have declined slightly since then. During the period of rapid expansion, average credits completed increased in consumer and homemaking economics (C&HE) and in general labor market preparation (GLMP) courses, as well as in specific labor market preparation (SLMP) courses. By contrast, declines in the average number of vocational credits completed after 1979-82 were concentrated in C&HE and GLMP courses; the average number of credits completed in SLMP courses has held steady at about 3 full-year courses since 1979-82.

Table 3
Total Credits Completed and Percentage of Students Participating in the Various Vocational Curricula, by Year of Graduation

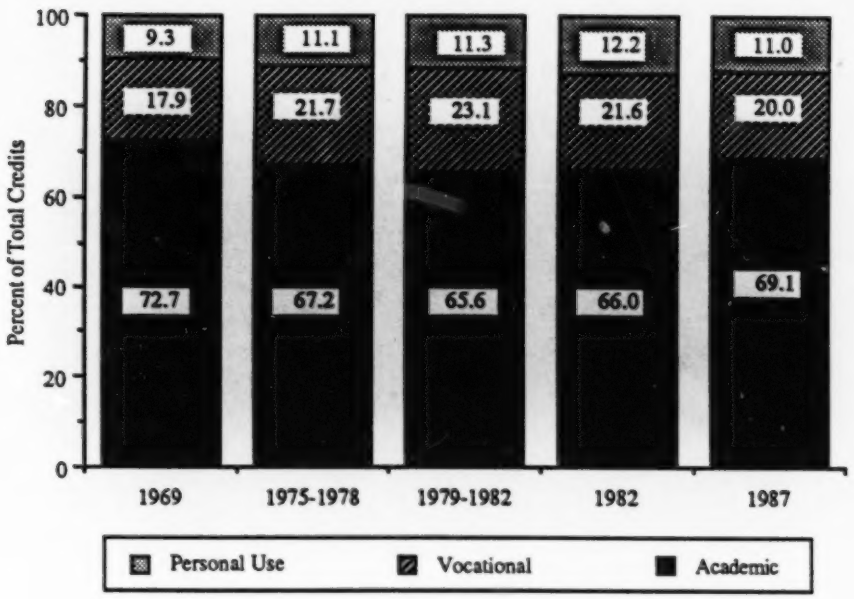
	Total vocational credits	C&HE credits	%who took C&HE credits	GLMP credits	% who took GLMP credits	SLMP credits	% who took SLMP credits
1987	4.53	0.61	45.66%	0.94	80.40%	2.97	87.37%
1982	4.64	0.68	50.19	1.02	78.80	2.94	86.73
1979-82	4.89	0.69	51.80	1.27	82.27	2.93	85.38
1975-78	4.50	0.67	48.61	1.26	83.13	2.57	82.66
1969	3.67	0.48	31.76	1.10	76.07	2.10	72.34

Despite the large increases between 1982 and 1987 in the average number of academic courses completed by graduates, average levels of participation in the vocational curriculum declined only slightly after 1982. Thus, even though students are being required to take more academic education, they continue to participate in the vocational curriculum.

Figure 1 shows how the distribution of credits reflects the changing emphases within the high school curriculum. Academic credits as a percentage of the total were highest in 1969, at 72.7 percent. The average percentage of credits taken in the academic curriculum declined to a low of 65.6 percent between 1979 and 1982, but by 1987, academic credits accounted for 68.7 percent of the total. In contrast, vocational credits as a fraction of total credits were lowest in 1969—17.9 percent—but between 1979 and 1982, vocational credits accounted for almost one-fourth of the total—23.1 percent. By 1987, the fraction of courses taken by graduates in vocational education had declined to 19.5 percent of all credits. Personal use credits, after a slight increase between 1969 and 1975-78 from 9.3 percent to 11.1 percent of the total, were quite stable over time, fluctuating between 11 and 12 percent of total courses completed.

When viewed in this way, there appears to be a tradeoff between participation in the academic and vocational curricula. Within the total number of credits a high school student can earn, the student must choose between participating in the academic, vocational, or personal use curricula. Thus, while increases in the number of academic credits completed by public high school graduates do not appear to be at the expense of maintaining absolute participation in the vocational curriculum, they do appear to come at the expense of relative participation in the vocational curriculum.

Figure 1
Percentage of Credits Taken in Each Curriculum



IV. Trends in High School Participation Among College- and Non-College-Bound Youth

The previous section described the course-taking patterns of the "average" high school graduate between 1969 and 1987. This is informative as a description of general trends within the secondary curriculum, but it glosses over important differences in patterns of participation among different groups of students. This section examines how patterns of participation have consistently been different among students with different plans after high school.

Table 4 shows the percentage of high school graduates with plans to work full time, attend a two-year postsecondary institution, attend a four-year postsecondary institution, or with other, unspecified plans after high school. These data show some interesting and somewhat surprising trends. For example, the percentage of students planning to go to work full-time after high school declined sharply from 31 percent in 1982 to 16.5 percent in 1987. This decline followed a period of at least five years in which the percentage of students planning to go straight to work had been relatively steady at approximately one-third of the graduating class.[12] While the proportion of students planning to go to work full-time after high

school fell by almost 15 percentage points between 1982 and 1987, the proportion of students planning to attend a four-year college increased by slightly more than 15 percentage points over the same period. In fact, 1987 marks the first time that a majority of high school graduates said they were planning to attend a four-year college. Close to one-half of all graduates planned to attend a four-year postsecondary institution in 1975-78 (47 percent) and 1979-82 (46.1 percent), but the percentage of students bound for a four-year school fell to 35 percent in 1982. While we believe that the volatility in these numbers is to some extent attributable to sampling error, we also believe that these data do suggest that a larger percentage of students are making plans to go on to college than was the case in 1982.[13] This trend toward higher education cannot necessarily be attributed to the education reform movement, but we have seen no evidence that the two are not related.

Table 4
Percentage of High School Graduates with Specified Plans After high School, by Year of Graduation

	1969	1975-78	1979-82	1982	1987
FT Work	1.8%	29.7%	36.1%	31.0%	16.5%
2-yrs. college	13.5	23.2	17.7	15.0	22.0
4-yrs. college	41.3	47.0	46.1	35.0	50.7
Other	43.4	–	–	19.0	10.8

The patterns of participation in the secondary curriculum vary substantially among students with different plans after high school (Table 5).[14] Between 1969 and 1987, the average number of credits completed by students planning to go to work after graduation increased from 19.92 to 21.89 (two full-year courses); the average number of credits completed by graduates planning to attend a two-year college increased from 20.91 to 22.23 (one and one-third full-year courses); and the average number of credits completed by those planning to go on to a four-year college increased from 20.77 to 23.31 (two and one-half full-year courses). Thus, the largest average gains were realized by students who planned to attend a four-year college, and the smallest average gains were realized by students planning to attend a two-year college. However, even though the average number of credits completed by non-college-bound graduates increased by more than the number of credits completed by those going on to two-year colleges, non-college-bound graduates completed fewer total credits than students with any college plans.

Table 5
Total Credits Completed and Percentage of Students Participating in the Various High School Curricula, by Year of Graduation and Plans After High School

	Total credits	Academic credits	Vocational credits	% who took vocational credits	Personal use/other credits	% who took personal credits
1987						
FT Work	21.89	13.17	6.31	99.62%	2.41	98.78%
2-yr. college	22.23	14.28	5.41	99.61	2.54	98.38
4-yr. college	23.31	17.65	3.21	96.71	2.46	97.60
1982						
FT Work	21.00	12.44	5.92	99.51	2.61	99.17
2-yr. college	21.67	14.40	4.40	98.18	2.83	98.29
4-yr. college	22.13	16.53	3.09	94.99	2.50	98.54
1979-82						
Work	20.81	12.07	6.34	99.56	2.40	98.45
Some college	21.03	12.98	5.64	99.76	2.39	98.49
4-yr. college	21.56	15.68	3.46	95.57	2.41	98.93
1975-78						
Work	20.15	11.91	6.08	99.70	2.16	96.89
Some college	20.67	13.19	5.11	98.49	2.37	97.97
4-yr. college	21.23	15.65	3.20	93.92	2.37	97.13
1969						
FT Work	19.92	12.97	5.31	100.00	1.64	100.00
2-yr. college	20.91	14.32	4.24	97.55	2.34	95.74
4-yr. college	20.77	16.68	2.19	83.81	1.90	97.06

Despite the substantial gains in average total credits completed by all high school graduates between 1969 and 1987, there was an increase in academic credits only among the students who planned to go to a four-year college (Table 5). The average number of academic credits completed actually declined between 1969 and 1979-82 among all three groups of graduates, and only among those graduates who planned to attend a four-year college were increases in the number of academic credits between 1979-82 and 1987 large enough to offset these initial declines. The number of credits completed by students planning to work or to attend a two-year school did increase after 1979-82, but the were no statistically significant differences in the number of credits completed by 1969 graduates and 1987 graduates whose plans did not include a four-year college.

The trends in vocational education among students with different plans after high school were somewhat surprising. Between 1969 and 1979-82, the average number of vocational credits completed increased among all students, regardless of their plans after high school (Table 5). After a slight dip between the 1979-82 cohort and the 1982 cohort in the average number of vocational credits completed by all graduates, average vocational credits completed by 1987 graduates had rebounded to 1979-82 levels, again regardless of their plans after high school. This finding was unexpected, since the pattern in vocational course taking for all graduates was toward fewer vocational courses between 1979-82 and 1987.

However, because a greater proportion of students planned to go on to both two- and four-year colleges in 1987 than in 1979-82, students were taking fewer vocational courses overall. Students planning to leave school and go directly to work took substantially more vocational education on average than students who planned to go on to college, and those aiming toward a two-year college completed more vocational education on average than those heading toward a four-year college. Thus, when students' plans after high school were controlled, the pattern of participation in the vocational education curriculum by high school graduates did not change much between 1979-82 and 1987. The average number of credits declined overall because a smaller proportion of students were planning to go directly to work after high school.

A more detailed examination of participation trends in the academic curriculum reveals that changes in patterns of participation have been largely confined to math, science, and foreign languages among students in each of the three groups defined by their plans after high school (Table 6). Participation in English, social studies, and fine arts has been unchanged since 1969.

The average number of math credits completed by students planning to work after high school have consistently increased over time. However, the average number of credits taken in advanced math and calculus by 1987 graduates was no different than the number completed by 1969 graduates. Thus, all of the growth in the average number of mathematics credits completed by non-college-bound high school graduates between 1969 and 1987 was at the basic or general levels, even during the period of reform. In contrast, the average number of math credits completed by graduates intending to go on to either a two-year or a four-year college was unchanged between 1969 and 1979-82; only after 1979-82 did the average number of credits completed by these students start to increase. However, even though students planning to attend two- and four-year colleges exhibited the same general pattern of course

taking in math overall, only among graduates planning to go on to a four-year college did the number of advanced math and calculus credits increase.

Table 6
Average Number of Credits Completed in Academic Subjects, by Plans After High School and Year of Graduation

	English	Mathe-matics	Calculus & advanced math	Science	Chemistry and physics	Social studies	Fine arts	Foreign language
1987								
FT Work	3.79	2.46	0.27	1.94	0.20	3.03	1.33	0.62
2-yr. college	3.91	2.70	0.41	2.20	0.37	3.14	1.32	1.00
4-yr. college	4.13	3.46	1.23	3.12	1.14	3.36	1.57	2.02
1982								
FT Work	3.75	2.08	0.25	1.75	0.19	3.06	1.34	0.46
2-yr. college	3.91	2.56	0.59	2.13	0.48	3.24	1.49	1.08
4-yr. college	4.04	3.20	1.16	2.82	0.99	3.25	1.57	1.65
1979-82								
Work	3.66	1.94	0.21	1.71	0.26	3.07	1.31	0.38
Some college	3.66	2.17	0.38	1.90	0.39	3.02	1.47	0.76
4-yr. college	3.87	2.94	0.84	2.67	0.83	3.20	1.59	1.41
1975-78								
Work	3.55	1.84	0.17	1.81	0.22	3.04	1.19	0.47
Some college	3.56	2.12	0.31	2.02	0.37	3.15	1.50	0.84
4-yr. college	3.82	2.78	0.84	2.67	0.80	3.23	1.48	1.66
1969								
FT Work	3.92	1.59	0.22	1.92	0.20	3.57	1.24	0.72
2-yr. college	3.90	2.38	0.43	2.11	0.29	3.27	1.26	1.41
4-yr. college	4.19	2.99	0.87	2.52	0.81	3.37	1.22	2.39

In science, each successive cohort of graduates with plans to attend a four-year college completed more credits than previous cohorts, and, after 1979-82, at least half of these increases were in chemistry or physics. In contrast to those planning to go to a four-year college, the average number of science credits completed by 1969 graduates who planned to attend a two-year college or go directly to work was higher than the number of credits completed by graduates with similar plans after high school in 1979-82. Although the average number of science credits completed started to rebound after 1979-82, 1987 graduates with plans to work or to attend a two-year college completed approximately the same number of

credits as their peers in the 1969 cohort. Furthermore, virtually all of the growth in science credits among these students was in general and basic science; the number of credits completed in chemistry and physics by graduates with plans to work or attend a two-year college was no different among members of the 1987 cohort than among the 1979-82 cohort.

In general, students planning to go to work after high school completed more vocational education than students who had plans to attend college (Table 7). The differences between non-college-bound students and those planning to go on to a two-year college were generally small in the C&HE and GLMP courses, but differences in the SLMP curriculum were quite pronounced after 1969. Students planning to go on to a four-year college took fewer courses in each of the vocational subdivisions than students in either of these other groups in each year for which we have data.

Table 7
Total Credits Completed and Percentage of Students Participating in the Various Vocational Curricula, by Plans After High School and Year of Graduation

	C&HE credits	%who took C&HE credits	GLMP credits	% who took GLMP credits	SLMP credits	% who took SLMP credits
1987						
FT Work	0.79	52.75%	1.06	82.65%	4.46	92.97%
2-yr. college	0.76	54.51	1.06	83.91	3.59	92.64
4-yr college	0.43	37.46	0.81	78.21	1.97	81.04
1982						
FT Work	0.77	54.22	1.18	79.31	3.97	93.41
2-yr. college	0.73	53.44	1.04	83.20	2.63	87.27
4-yr. college	0.43	37.41	0.84	78.61	1.83	76.52
1979-82						
Work	0.86	58.34	1.52	83.04	3.96	92.83
Some college	0.88	58.65	1.33	87.32	3.43	92.79
4-yr. college	0.48	44.20	1.04	80.03	1.95	76.65
1975-78						
Work	0.87	55.31	1.56	87.29	3.65	92.87
Some college	0.77	54.97	1.42	85.54	2.92	88.19
4-yr. college	0.48	41.42	0.99	79.15	1.73	73.44
1969						
FT Work	1.72	79.97	1.37	92.74	2.22	76.62
2-yr. college	0.48	31.90	1.37	84.49	2.39	83.00
4-yr. college	0.24	20.52	0.79	66.79	1.16	52.61

Regardless of their plans after high school, high school graduates completed most of their vocational credits in SLMP courses. However, there were large differences in the number of total SLMP credits completed by students with different plans. For example, among students planning to attend a four-year college, the average number of SLMP credits increased from 1.16 in 1969 to 1.95 in 1979-82; these students continued to complete approximately two full-year courses in a specific labor market preparation area through 1987. Only among students with plans to work after high school did the average number of SLMP credits consistently increase from one year to the next. These students completed an average of 2.22 credits in 1969, and by 1987, they were each taking approximately 4.46 credits. By 1987, then, the average non-college-bound student was completing one-fifth of all of their credits in the SLMP curriculum.

V. Why More Academic Course-Work?

Our description of course-taking trends among high school graduates over the last two decades shows that students are responsive to the curricular demands that are placed on them. One of the primary policy responses to the crisis in education has been to raise high school graduation requirements. The results of these policy efforts appear to be greater average course loads among high school graduates, and particularly more course work in mathematics, science, and foreign languages. In addition, our findings suggest that more students were planning to go on to college in 1987 than in 1982. While we cannot directly attribute the increased emphasis on college education to education reform efforts, we do not believe that the two are unrelated. The increase in course work and the greater emphasis on college-level education are impressive gains and should be applauded.

However, while some of the results of our study are promising, others of our findings are disturbing. Education reform has been concerned with "educational excellence," and excellence has been narrowly defined to mean more academic course work. The logic behind emphasizing academic education goes something like this: more academics equals higher achievement (defined as higher scores on standardized tests), and higher achievement means superior economic "competitiveness." Unfortunately, the logic of the reform movement is suspect at both junctures.

There is no doubt that graduates are taking more academic education, and the increases in the number of credits completed by students in the academic curriculum has been endlessly extolled by politicians and pundits. Within the education community, however, the emphasis of the reform movement on academic education is not universally approved. As one observer lamented, "[one] wonder[s] how requiring more academic courses will improve the basic skills of students already discouraged enough to drop out."[15] According to the William T. Grant Commission on Work, Family and Citizenship,

> Most of the reform reports have dwelled on the importance of discipline in the schools and uniformity in the curriculum... However, if this call for discipline and uniformity leads to a school regimen that stifles young people and stresses the routine to the detriment of innovation, it will not foster schools of excellence. Research in education has consistently concluded that different students learn best in different ways... An attempt to homogenize schooling will not create better education for all. Instead, it is an effort to narrow schooling to suit the few.[16]

The academic emphasis of reform, as this quote suggests, is exclusive, if not exclusionary. While all groups of students are completing more math and science, the gains in course taking are uneven among different groups of students. Unlike those graduates who are bound for a four-year college, non-college-bound high school graduates did not complete more advanced math and science credits (trigonometry, physics, or calculus, for example) in 1987 than they did in 1982 or even 1969. Thus, students who intend to go on to college are most responsive to current reform efforts, while students who are leaving high school with plans to enter the labor force directly are not experiencing the same benefits.

These results are troubling because they suggest that current reform measures are not targeted to the students who are most in need. The students who are most at risk of being economically disenfranchised are those that do not finish high school or whose formal education does not extend beyond high school. For example, between 1973 and 1986, the real wages of young men aged 20 to 24 who had not completed high school declined by 42 percent and the real wages of high school graduates declined by 28 percent. Over the same period, the real wages of those with some college declined by 16 percent, and among college graduates real wages declined by 6 percent.[17] These declines in wages occurred even though the number of credits completed by high school graduates has steadily been increasing since 1969. One of the major problems with the American education system is that students who leave high school for work are ill-prepared for the tasks they will encounter on the job, yet the reform policies

advocated by politicians and implemented by legislatures and school boards apparently do not address the needs of students who do not plan to attend a postsecondary institution.

The current model of reform—more math, more science, more hours in school—is based on the assumption that there is nothing fundamentally wrong with the way children are educated. For many students, this assumption is valid. They can sit still for six hours each school day, listen to their teachers, do their homework, and dutifully respond to tests of their competence.[18] These are the students who end up being labeled "smart" and "college-bound." That is fine. But for students who were not being adequately served by the educational system before reform, how can additional seat time be helpful? These students, who may not be "college material" simply because the mode of learning does not suit them, are meeting the higher graduation requirements, but are not clearly better off for it. The model for reform suits students who are already least likely to fail. These are the students who are bound for college. Yet, in many respects, the system of postsecondary education in the United States is an unrivaled success story, the ". . . envy of the world" according to one recent study.[19] Thus, the current model of school reform, increasing academic graduation requirements, focuses resources and concentrates the benefits of educational improvements on a population that will soon partake in an educational system that is already unparalleled. This strikes us as a redundant and misguided policy for reform.

Pervading the arguments in defense of higher standards is the idea that more education makes people more productive. While the seamless linear relationship between education and higher productivity may be true on average, there is no clear evidence that incremental additions to knowledge have any effect on human productive capacities.[20] No where has it been clearly established that an additional math and science course over three or four years of secondary education will have any economic impact whatsoever.

Even if we accept the idea that small changes in course work do matter, there is still the problem of specifying which changes matter. For example, do students become more productive because they have a better command of the English language, because they have taken trigonometry, or because they know the date of the Emancipation Proclamation? Without a better understanding of how labor markets value specific skills or sets of skills, it will be difficult to specify which skills students should be learning in high school. Moreover, one must assume that the labor market has some capacity to absorb and use information about high school graduates and their abilities. While we would all like to believe that employers review an applicant"s credentials carefully, absorbing information takes time and is therefore costly. The first level of screening is probably whether or not a person has got a particular degree, whether

he or she attended college, and other gross indicators. The extent to which the labor market will respond to incremental changes in the average student's high school preparation is very much open to doubt.[21]

Aside from the theoretical objections to the justifications that have typically been invoked in favor of higher graduation requirements, there is considerable empirical evidence to suggest that small changes in the number of credits completed in high school will not be translated into significant economic gains. We have already noted that the real wages of young men with a high school diploma declined sharply between 1973 and 1986, despite increases in the average number of credits completed in high school. In addition, the average wages of high school graduates are not much affected by small amounts of postsecondary education, so why should we believe that small changes in high school course taking will have significant effects? Table 8 shows the average wages per hour of high school graduates in 1986. Those who had completed some postsecondary education earned, on average, 16 cents more per hour than those who had not completed any postsecondary education. Moreover, the difference between the average wages of those who had completed some postsecondary education and those who had completed a one- or two-year postsecondary degree or certificate was 22 cents per hour among 1980 high school graduates and 42 cents per hour among 1972 high school graduates. Only when students completed a bachelor's degree or higher did these gains in education translate into significant economic gains.[22] While this evidence is admittedly circumstantial, it does not suggest that the incremental increases in education attainment are valued within the labor market. Thus, there is little reason to believe that higher graduation standards on the margin will have any impact on the welfare of the students (or the economy).

Table 8
Average Hourly Wages of High School Graduates Working Full-Time in 1986, by Year of Graduation and Educational Attainment

Type of degree	Year of graduation 1980	1972
HS diploma	$5.72	$7.01
Some PSE	5.88	7.17
1- or 2-year degree	6.10	7.59
BA/BS	7.87	8.71
Advanced degree	—	10.80

Raising Graduation Requirements as a Policy Response

Even if the labor market was sensitive to small changes in the number and type of courses taken by students in high school, there would be reason to doubt whether raising the graduation requirements for all students is a sensible policy response. Raising graduation requirements is a blunt instrument that does not target help to those who need it and compels students who do not need to take more courses in high school to do so anyway. Thus, it does not effectively solve the education problem, and does not do so at a much greater cost than it should. If more courses are required for every student, then schools must hire more teachers, more support staff, and must provide more resources such as building space and supplies. These inputs into the education system all cost money, and providing them for every student whether he or she needs them or not is a waste of resources.

The modest gains in the average number of credits completed by students are laudable. However, these gains will probably not be adequate solve the economic problems that are cited by the proponents of educational reform. Encouraging college-bound students to take calculus and chemistry may alleviate the need for them to take elementary versions of these courses at the college level, but it is difficult to see how these changes on the margin are going to alter the life prospects of students who will continue their formal education for two, four, or more years at the college level. Likewise, it is difficult to imagine how an additional math or science class in high school is going to improve the life prospects of a student for whom the high school diploma is a terminal degree.

Despite these criticisms, we do see some positive trends in secondary education. If a greater percentage of students are planning to go on to college now than were before the beginning of the reform era, this is a very positive result. Leslie and Brinkman conclude that the return ". . . on the public investment in undergraduate education very likely falls between 11.6 and 12.1 percent."[23] In addition, they conclude that ". . . the non-monetary social benefits may be roughly equivalent to the monetary ones, thus, by implication, roughly doubling the effective social rate of return."[24] Yet if the goal of education reform policy is to encourage more students to go to college, then the policy ought to directly promote that goal by making financial aid available and providing increased counseling services for at-risk students. There should be a national guarantee that no qualified student will be denied a postsecondary education for lack of fiscal means.

Even so, however, not all students will opt to go to college. Resources must be targeted to these students. Vocational education in this country has been treated as the illegitimate child of the secondary education system, yet vocational training in other nations is a productive and coveted opportunity for many students. Research conducted by the National Assessment of Vocational Education (NAVE) shows that students participating in a vocational curriculum enriched with math learn more math.[25] They also gain valuable skills that lead directly to employment. Encouraging students who are not bound for college to take more academic education at the expense of participation in the vocational curriculum may actually hurt their chances for employment after high school without necessarily improving their grasp of the basic skills.

VI. Conclusion

One of the primary policy responses to the perceived crisis in the nation's education system has been to raise high school graduation requirements. This policy has had the intended effect of raising the number of credits completed by high school graduates. However, increasing the amount of time students spend in school is not, in and of itself, the stated goal of this policy. Raising standard graduation requirements has been defended as a means to other ends: educational excellence and increasing the "competitiveness" of the American labor force. Alas, the policy seems to be sadly out of touch with the stated objectives, since there is no clear evidence that an additional math and science course in four years of secondary education will contribute much of anything to the economic welfare of the nation's secondary students.

Higher graduation standards have had the largest impact on students who plan to attend a four-year college. These students are taking more advanced math, science and foreign languages, which will alleviate the need for them to take such courses as introductory calculus or physics once they reach the college level. Since average expenditures per student are typically higher at the college level than at the secondary level, this may prove to be a good investment from a social point of view. However, the benefits accruing to the individual from this policy are difficult to identify.

A greater percentage of 1987 high school graduates than of the graduates of the class of 1982 said they were planning to attend college. To the extent that this is due to reform efforts those efforts should be applauded. There is substantial evidence that postsecondary education is a good investment for the individual and for society.

However, the economic benefits of reform accruing to the non-college-bound are difficult to identify. These students have benefitted the least from reform, at least in terms of the number and type of courses they complete while in high school, and the gains they have made do not appear to bear any relationship to the economic ends that are so often invoked to justify the policy of higher graduation standards. If the objective of educational reform is to produce a more competitive work force and to provide students with the means to succeed in the labor market, we need to target our reforms to those who are most likely to be economically disenfranchised, not to those who are already most likely to succeed.

The policies that must be pursued if we are serious about reform for the benefit of all students must be addressed to the problem which they are purportedly designed to solve. Raising graduation standards because on average more education has been correlated with better economic outcomes is a simplistic response that ignores the wealth of theory on the subject of education and economic welfare. Even so, one policy that should be pursued is to develop a more comprehensive understanding of how the youth labor market functions and design policy options based on a well-conceived theoretical foundation. Likewise, if the objective of educational reform is to promote certain basic skills that are deemed necessary for economic success, then we should teach those basic skills and not grant a high school diploma until each student has a solid grasp of these fundamentals. Some of this is already going on, and the recent report of the National Governor's Association has pushed this idea forward by advocating comprehensive skills testing in the fourth, eighth, and twelfth grades. Yet if the objective of educational policy is to promote certain skills and types of understanding among students, then why not abandon the current emphasis on grades (i.e. K-12, not letter grades) as a means sorting students. Why not have students advance at their own pace at all levels. Some students may graduate at the age of 14, other not until they are 22; yet the emphasis should be on providing students with the skills they need, not advancement because of age. Thus, the issue becomes competency, not seat time.

Other policy alternatives can be devised. Some will work; others may not. But the issue here is that the educational policies that we as a society pursue must be related to the educational goals that we as a society advocate. Raising graduation requirements is an easy policy option because it does not really require any fundamental changes in the way we educate our children. Our work shows that students' experiences in high school are relatively elastic and responsive to the demands that we place on them. But there is no evidence that students, particularly those who do not plan to go to a four-year college, are responding as the advocates of reform had hoped. Our results show that a policy that addresses the process of education can

effectively alter the process. Yet the changes are defended by reference to improved outcomes. Our data do not lead us to be optimistic that post-reform outcomes will be substantially better than pre-reform outcomes. If the system is so bad then we should have the courage to try new things. If we seek to alter outcomes, then perhaps we should try policies that directly affect outcomes (such as not graduating students until they meet minimum competency requirements). Implementing policies that are only marginally related to the ends we seek is neither good policy nor likely to advance the objectives of policy.

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[1] For a recent discussion of the recurring nature of American educational reforms, see Larry Cuban, "Reforming Again, Again, and Again," in *Educational Researcher* (American Educational Research Association: Washington, D.C.), Volume 19, Number 1, January-February 1990, 3-13.

[2] *A Nation at Risk: The Imperative for Educational Reform*, The National Commission on Excellence in Education (U.S. Government Printing Office: Washington, D.C., April 1983), 5.

[3] The meaning of educational excellence until recently was never really clearly defined. However, the National Governor's Association has recently put forward an ambitious and detailed set of objectives that might be considered a clear statement of what is meant by educational excellence. See *The New York Times*, February 26, 1990, A1.

[4] The Center for Policy Research in Education, "Graduating from High School: New Standards in the States," a research brief based on William Clune's study, *The Implementation and Effects of High School Graduation Requirements: First Steps Toward Curricular Reform*, NAASP Bulletin, March 1989, 61.

[5] The year in which students in each sample graduated from high school is shown in parentheses.

[6] The Secondary School Taxonomy was developed by Robert Meyer at the National Assessment of Vocational Education and Cynthia Brown at MPR Associates, Inc. Refinements that were made to the taxonomy to accommodate the different data sets are described in Gifford, Tuma, and Hoachlander, *The Secondary School Taxonomy Report*, a report prepared for the National Assessment of Vocational Education, March 1989.

[7] A complete description of the decision rules is included in Appendix 2.

[8] We used a procedure called PROC CDCTAB to calculate accurate standard errors. This procedure was developed by C. Dennis Carroll at the National Center for Education Statistics.

[9] This section is based on prior work by Tuma, Gifford, Horn, and Hoachlander, *Patterns of Student Participation in the Public High School Curriculum, 1969 to 1987*, a report prepared for the National Assessment of Vocational Education, U.S. Department of Education, April 1989. The 1987 results presented here differ slightly from the previously published statistics because the "Plans After High School" variable was available for only one-half of the students in the NAEP sample. See Appendix 2 for details of these differences.

[10] The years for which we have transcript data is an idiosyncratic result: we took advantage of the years for which data were available. However, because of the small annual sample size of the NLS-Youth data set, several graduating classes had to be aggregated in order to produce reliable statistics. This is why we present the average enrollment statistics for 1975-78 and 1979-82. Standard error tables are presented in Appendix 2.

[11] The rapid increase in credits is very striking after the relatively long period of stability in the total number of credits completed, and initially suggested that perhaps there was some difference in the way credits had been coded in the original data. However, a study conducted in California on the effects of school reform using master course lists and data from the California Basic Education Data System indicated increases of equal magnitude. See Pamela L. Grossman, Michael W. Kirst, and Jackie Schmidt-Posner, "On the Trail of the Omnibeast: Evaluating Omnibus Education Reforms in the 1980s," *Education Evaluation and Policy Analysis* 8 no.3 (1986): 253-266.

[12] The percentage of students planning to work full-time was very low—1.8 percent—in 1969. This number may be low in part because of the data collection procedures used in the ETS survey, but it is also probably due to some extent to the Viet Nam War.

[13] The 1982 data, derived from High School and Beyond, are probably the most reliable data. The number of missing cases as a proportion of total cases was somewhat higher for the other data sets, and data were most likely to be missing for students who do not plan to go on to college. However, we spent several months specifying the samples and carefully analyzing the patterns of missing data, and do not believe that the difference in the percentages of students planning to work in 1982 and 1987 can be attributed to sampling problems.

[14] The tables presenting data on course-taking patterns of students with different plans after high school only include those students who planned to work, to attend a two-year college, or to attend a four-year college. The "other" category has been excluded from these tables to aid in the simplicity of presentation. Data for the "other" category are shown in the standard error tables in Appendix 2.

[15] Copa and Johnson, *Vocational Education and High School Graduation Requirements*, (Minnesota Research and Development Center for Vocational Education,University of Minnesota: St. Paul, MN), 17.

[16] *The Forgotten Half: Non-College Youth in America*, the interim report of Youth and America's Future: The William T. Grant Foundation Commission on Work, Family and Citizenship (Washington, D.C., 1988), 29.

[17] *The Forgotten Half: Pathways to Success for America's Youth and Young Families*, the final report of Youth and America's Future: The William T. Grant Foundation Commission on Work, Family and Citizenship (Washington, D.C., 1988), Table 6.

[18] For an interesting discussion of how the current system fails many students, see Albert Shanker, "The End of the Traditional Model of Schooling—and A Proposal for Using Incentives to Restructure Our Public Schools," *Phi Delta Kappan*, January 1990, 345-357.

[19] Michael L. Dertouzos, Richard K. Lester, Robert M. Solow, and the MIT Commission on Industrial Productivity, *Made in America: Regaining the Productive Edge* (MIT Press: Cambridge, MA, 1989), 85.

[20] There is considerable disagreement about the impact of education on productivity. There is no doubt that more education and higher incomes are highly correlated, but the human capital argument—that more education leads to greater embodiments of human capital in an individual—is only one of several competing theories that purport to explain this relationship. Some researchers argue that education, and particularly higher education, are a means to distinguish among people with different innate ability. Still others contend that there is a "credentialling effect," and that investments in human capital are only recognized if they are accompanied by a credential. For a summary of these different arguments, see John Mace, "Education, the Labour Market and Government Policy," in *Economics and the Management of Education: Emerging Themes*, Thomas and Simkins, Eds., (The Falmer Press, Taylor and Francis Inc., Philadelphia, PA, 1987), pp. 21-32.

[21] David Ashton and Malcolm Maguire, in a review of the youth labor market in Great Britain, suggest the labor market for 16 to 24 year-olds is segmented and that the different segments value education differently. For students planning to go directly to work in semi-skilled manual or in retail jobs, additional education may actually be a detriment to obtaining employment (employers fear that their young employees would be over-qualified and easily bored). While the youth labor market in the United States may not operate in the same way as the British market, this study does suggest that the labor market is more complex than is typically acknowledged by policy makers. See David Ashton and Malcolm Maguire, The Structure of the Youth Labor Market: Some Implications for Education Policy," in *Economics and the Management of Education: Emerging Themes*, Ibid., 193-202.

[22] Wage data taken from Eagle, Fitzgerald, Gifford, and Tuma, *High School and Beyond: A Descriptive Summary of 1980 High School Seniors: Six Years Later*, and Eagle, Fitzgerald, Gifford, and Tuma, *National Longitudinal Study 1972: A Descriptive Summary of 1972 High School Seniors: Fourteen Years Later*, reports prepared by MPR Associates, Inc. for the National Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education (Washington, D.C., 1988).

[23] Larry L. Leslie and Paul T. Brinkman, The Economic Value of Higher Education (New York: American Council on Education and Macmillan Publishing Company, 1988), 11.

[24] Ibid., 12.

[25] National Assessment of Vocational Education, Final Report: Volume I: Summary of Findings and Recommendations (United States Department of Education: Washington, D.C., 1989), 76-77.

APPENDIX 1
OUTLINE OF THE SECONDARY SCHOOL TAXONOMY

I. ACADEMIC COURSES

Mathematics
- Basic
- General
- Applied
- Pre-Algebra
- Algebra I
- Geometry
- Advanced -- Other
- Advanced Calculus

Science
- Survey and Other Science
- Biological Science
- Chemistry
- Physics

English
- English Survey and Skills
- Language/Writing Skills
- Literature
- Composition and Writing
- Speech

Social Studies
- American History
- World History
- American Government and Politics
- Social Science, Humanities, and Other

Fine Arts
- Fine Arts and Crafts
- Music
- Dramatic Arts/Dance

Foreign Languages
- Survey and ESL
- Year 1
- Year 2
- Year 2 or Higher
- Year 3 or Higher

Foreign Languages by Language
- Spanish
- French
- German
- Latin
- Other (Including Survey)
- English as a Second Language

II. VOCATIONAL EDUCATION CURRICULUM

Consumer and Homemaking Economics

General Labor Market Preparation
- Typewriting I
- Introductory Industrial
- Work Experience /Career Exploration
- General Labor Market Skills

Specific Labor Market Preparation
- Agriculture and Renewable Resources
- Business Management
- Business Support
- Marketing and Distribution
- Health
- Occupational Home Economics
- Trade and Industrial
  - Construction Trades
  - Mechanics and Repairers
  - Precision Production
  - Transportation and Material Moving
- Technical and Communications
- Specific Labor Market, Unidentified Subject

III. PERSONAL/OTHER CURRICULUM
- General Skills
- Health, Physical and Recreation Education
- Religion and Theology
- Military Science

IV. SPECIAL EDUCATION
- Academic
- Vocational
- General

APPENDIX 2
STANDARD ERROR TABLES

Table 1
Total Credits Completed and Percentage of Students Participating in the Various High School Curricula, by Year of Graduation

	Total credits	Academic credits	Vocational credits	% who took vocational credits	Personal use/other credits	% who took personal use credits
1987	22.66	15.65	4.53	98.16%	2.49	98.07
	(0.129)	(0.165)	(0.113)	(0.426)	(0.100)	(1.341)
1982	21.47	14.17	4.64	97.77	2.63	98.65
	(0.057)	(0.065)	(0.051)	(0.199)	(0.031)	(0.215)
1979-82	21.19	13.90	4.89	97.70	2.40	98.73
	(0.099)	(0.113)	(0.091)	(0.371)	(0.053)	(0.285)
1975-88	20.77	13.96	4.50	96.73	2.30	97.25
	(0.081)	(0.106)	(0.086)	(0.507)	(0.050)	(0.513)
1969	20.47	14.89	3.67	91.94	1.90	97.53
	(0.251)	(0.276)	(0.292)	(1.058)	(0.212)	(0.170)

Table 2
Average Number of Credits Completed in Academic Subjects, by Year of Graduation

	Engish	Mathe-matics	Calculus & advanced math	Science	Chemistry and physics	Social studies	Fine arts	Foreign language
1987	3.99	3.01	0.77	2.57	0.70	3.21	1.47	1.37
	(0.033)	(0.046)	(0.037)	(0.052)	(0.037)	(0.040)	(0.055)	(0.076)
1982	3.87	2.55	0.61	2.17	0.50	3.16	1.46	0.97
	(0.018)	(0.018)	(0.013)	(0.020)	(0.015)	(0.021)	(0.028)	(0.022)
1979-82	3.76	2.44	0.53	2.18	0.52	3.12	1.47	0.92
	(0.028)	(0.030)	(0.024)	(0.038)	(0.030)	(0.032)	(0.044)	(0.039)
1975-88	3.69	2.35	0.49	2.26	0.52	3.15	1.40	1.11
	(0.027)	(0.031)	(0.026)	(0.038)	(0.021)	(0.027)	(0.047)	(0.042)
1969	4.07	2.47	0.54	2.23	0.47	3.39	1.17	1.57
	(0.047)	(0.059)	(0.034)	(0.026)	(0.017)	(0.047)	(0.059)	(0.178)

Table 3
Total Credits Completed and Percentage of Students Participating in the Various Vocational Curricula, by Year of Graduation

	C&HE credits	%who took C&HE credits	GLMP credits	% who took GLMP credits	SLMP credits	% who took SLMP credits
1987	0.61	45.66%	0.94	80.40%	2.97	87.37%
	(0.031)	(1.858)	(0.035)	(1.747)	(0.098)	(1.131)
1982	0.68	50.19	1.02	78.80	2.94	86.73
	(0.015)	(0.862)	(0.018)	(0.651)	(0.045)	(0.505)
1979-82	0.69	51.80	1.27	82.27	2.93	85.38
	(0.029)	(1.490)	(0.038)	(1.177)	(0.072)	(0.891)
1975-88	0.67	48.61	1.26	83.13	2.57	82.66
	(0.030)	(1.586)	(0.038)	(1.004)	(0.069)	(1.035)
1969	0.48	31.76	1.10	76.07	2.10	72.34
	(0.055)	(2.878)	(0.101)	(1.501)	(0.279)	(3.037)

—THERE ARE NO STANDARD ERRORS FOR TABLE 4—

Table 5
Total Credits Completed and Percentage of Students Participating in the Various High School Curricula, by Year of Graduation and Plans After High School

	Total credits	Academic credits	Vocational credits	% who took vocational credits	Personal use/other credits	% who took personal credits
1987						
FT Work	21.89	13.17	6.31	99.62%	2.41	98.78%
	(0.178)	(0.170)	(0.203)	(0.188)	(0.101)	(0.871)
2-yr. college	22.23	14.28	5.41	99.61	2.54	98.38
	(0.203)	(0.164)	(0.162)	(0.200)	(0.147)	(1.001)
4-yr. college	23.31	17.65	3.21	96.71	2.46	97.60
	(0.135)	(0.203)	(0.116)	(0.841)	(0.102)	(1.707)
Other	22.10	13.94	5.71	98.69	2.45	98.86
	(0.273)	(0.210)	(0.276)	(0.506)	(0.133)	(0.941)
1982						
FT Work	21.00	12.44	5.92	99.51	2.61	99.17
	(0.094)	(0.098)	(0.090)	(0.178)	(0.046)	(0.293)
2-yr. college	21.67	14.40	4.40	98.18	2.83	98.29
	(0.106)	(0.128)	(0.103)	(0.462	(0.066)	(0.511)
4-yr. college	22.13	16.53	3.09	94.99	2.50	98.54
	(0.088)	(0.104)	(0.068)	(0.576)	(0.045)	(0.402)
Other	20.94	13.29	4.95	98.93	2.68	99.24
	(0.138)	(0.175)	(0.123)	(0.414)	(0.076)	(0.359)
1979-82						
Work	20.81	12.07	6.34	99.56	2.40	98.45
	(0.120)	(0.114)	(0.107)	(0.210)	(0.059)	(0.444)
Some college	21.03	12.98	5.64	99.76	2.39	98.49
	(0.180)	(0.154)	(0.155)	(0.242)	(0.084)	(0.586)
4-yr. college	21.56	15.68	3.46	95.57	2.41	98.93
	(0.184)	(0.237)	(0.159)	(1.538)	(0.111)	(0.525)
1975-88						
Work	20.15	11.91	6.08	99.70	2.16	96.89
	(0.122)	(0.142)	(0.136)	(0.232)	(0.063)	(0.948)
Some college	20.67	13.19	5.11	98.49	2.37	97.97
	(0.125)	(0.163)	(0.136)	(0.689)	(0.072)	(0.654)
4-yr. college	21.23	15.65	3.20	93.92	2.37	97.13
	(0.172)	(0.226)	(0.128)	(2.074)	(0.096)	(0.853)
1969						
FT Work	19.92	12.97	5.31	100.00	1.64	100.00
	(0.391)	(0.322)	(0.208)	(0.000)	(0.042)	(0.000)
2-yr. college	20.91	14.32	4.24	97.55	2.34	95.74
	(0.411)	(0.329)	(0.347)	(1.470)	(0.089)	(1.121)
4-yr. college	20.77	16.68	2.19	83.81	1.90	97.06
	(0.460)	(0.218)	(0.188)	(1.022)	(0.058)	(1.163)
Other	20.11	13.41	4.87	97.85	1.83	98.61
	(0.323)	(0.217)	(0.235)	(1.382)	(0.075)	(1.005)

Table 6
Average Number of Credits Completed in Academic Subjects, by Plans After High School and Year of Graduation

	Engish	Mathe-matics	Calculus & advanced math	Science	Chemistry and physics	Social studies	Fine arts	Foreign language
1987								
FT Work	3.79	2.46	0.27	1.94	0.20	3.03	1.33	0.62
	(0.049)	(0.061)	(0.035)	(0.049)	(0.026)	(0.071)	(0.093)	(0.063)
2-yr. college	3.91	2.70	0.41	2.20	0.37	3.14	1.32	1.00
	(0.050)	(0.063)	(0.030)	(0.071)	(0.039)	(0.059)	(0.088)	(0.061)
4-yr. college	4.13	3.46	1.23	3.12	1.14	3.36	1.57	2.02
	(0.041)	(0.055)	(0.048)	(0.075)	(0.058)	(0.045)	(0.057)	(0.129)
Other	3.86	2.55	0.31	2.02	0.28	3.13	1.61	0.78
	(0.073)	(0.054)	(0.033)	(0.056)	(0.038)	(0.072)	(0.140)	(0.072)
1982								
FT Work	3.75	2.08	0.25	1.75	0.19	3.06	1.34	0.46
	(0.032)	(0.031)	(0.016)	(0.030)	(0.016)	(0.032)	(0.052)	(0.025)
2-yr. college	3.91	2.56	0.59	2.13	0.48	3.24	1.49	1.08
	(0.045)	(0.040)	(0.035)	(0.045)	(0.030)	(0.043)	(0.063)	(0.045)
4-yr. college	4.04	3.20	1.16	2.82	0.99	3.25	1.57	1.65
	(0.027)	(0.029)	(0.034)	(0.035)	(0.025)	(0.033)	(0.053)	(0.041)
Other	3.81	2.29	0.39	1.92	0.30	3.14	1.47	0.66
	(0.043)	(0.045)	(0.034)	(0.050)	(0.026)	(0.045)	(0.079)	(0.055)
1979-82								
Work	3.66	1.94	0.21	1.71	0.26	3.07	1.31	0.38
	(0.040)	(0.037)	(0.020)	(0.034)	(0.022)	(0.044)	(0.063)	(0.031
Some college	3.66	2.17	0.38	1.90	0.39	3.02	1.47	0.76
	(0.048)	(0.049)	(0.032)	(0.058)	(0.022)	(0.051)	(0.090)	(0.057)
4-yr. college	3.87	2.94	0.84	2.67	0.83	3.20	1.59	1.41
	(0.057)	(0.068)	(0.055)	(0.118)	(0.050)	(0.069)	(0.080)	(0.087)
1975-88								
Work	3.55	1.84	0.17	1.81	0.22	3.04	1.19	0.47
	(0.045)	(0.050)	(0.024)	(0.049)	(0.023)	(0.043)	(0.083)	(0.039)
Some college	3.56	2.12	0.31	2.02	0.37	3.15	1.50	0.84
	(0.048)	(0.053)	(0.030)	(0.062)	(0.033)	(0.055)	(0.083)	(0.062)
4-yr. college	3.82	2.78	0.84	2.67	0.80	3.23	1.48	1.66
	(0.057)	(0.064)	(0.055)	(0.082)	(0.043)	(0.064)	(0.110)	(0.088)
1969								
FT Work	3.92	1.59	0.22	1.92	0.20	3.57	1.24	0.72
	(0.032)	(0.117)	(0.064)	(0.146)	(0.028)	(0.087)	(0.131)	(0.160)
2-yr. college	3.90	2.38	0.43	2.11	0.29	3.27	1.26	1.41
	(0.056)	(0.051)	(0.034)	(0.036)	(0.019)	(0.087)	(0.060)	(0.228)
4-yr. college	4.19	2.99	0.87	2.52	0.81	3.37	1.22	2.39
	(0.032)	(0.031)	(0.033)	(0.079)	(0.061)	(0.067)	(0.059)	(0.155)
Other	3.98	2.04	0.26	2.02	0.22	3.40	1.09	0.87
	(0.027)	(0.089)	(0.005)	(0.032)	(0.025)	(0.075)	(0.037)	(0.102)

Table 7
Total Credits Completed and Percentage of Students Participating in the Various Vocational Curricula, by Plans After High School and Year of Graduation

	C&HE credits	%who took C&HE credits	GLMP credits	% who took GLMP credits	SLMP credits	% who took SLMP credits
1987						
FT Work	0.79	52.75%	1.06	82.65%	4.46	92.97%
	(0.054)	(2.619)	(0.050)	(1.814)	(0.188)	(1.624)
2-yr. college	0.76	54.51	1.06	83.91	3.59	92.64
	(0.066)	(2.667)	(0.047)	(2.037)	(0.160)	(1.585)
4-yr college	0.43	37.46	0.81	78.21	1.97	81.04
	(0.029)	(2.302)	(0.040)	(2.750)	(0.083)	(1.623)
Other	0.83	50.15	1.10	83.71	3.77	93.92
	(0.142)	(3.998)	(0.101)	2.081	(0.237)	(1.250)
1982						
FT Work	0.77	54.22	1.18	79.31	3.97	93.41
	(0.031)	(1.627)	(0.036)	(1.288)	(0.090)	(0.709)
2-yr. college	0.73	53.44	1.04	83.20	2.63	87.27
	(0.035)	(1.929)	(0.032)	(1.408)	(0.084)	(1.154)
4-yr. college	0.43	37.41	0.84	78.61	1.83	76.52
	(0.020)	(1.466)	(0.027)	(1.150)	(0.053)	(1.141)
Other	0.89	59.96	1.00	76.13	3.06	90.54
	(0.053)	(2.305)	(0.045)	(2.101)	(0.113)	(1.284)
1979-82						
Work	0.86	58.34	1.52	83.04	3.96	92.83
	(0.040)	(1.967)	(0.060)	(1.525)	(0.105)	(0.852)
Some college	0.88	58.65	1.33	87.32	3.43	92.79
	(0.065)	(2.753)	(0.056)	(1.806)	(0.148)	(1.240)
4-yr. college	0.48	44.20	1.04	80.03	1.95	76.65
	(0.039)	(3.530)	(0.062)	(2.547)	(0.129)	(3.322)
1975-88						
Work	0.87	55.31	1.56	87.29	3.65	92.87
	(0.068)	(2.720)	(0.067)	(1.537)	(0.129)	(1.205)
Some college	0.77	54.97	1.42	85.54	2.92	88.19
	(0.057)	(2.892)	(0.078)	(1.924)	(0.124)	(1.695)
4-yr. college	0.48	41.42	0.99	79.15	1.73	73.44
	(0.040)	(3.007)	(0.054)	(2.795)	(0.097)	(3.066)
1969						
FT Work	1.72	79.97	1.37	92.74	2.22	76.62
	(0.207)	(5.435)	(0.145)	(3.388)	(0.330)	(4.550)
2-yr. college	0.48	31.90	1.37	84.49	2.39	83.00
	(0.096)	(5.414)	(0.046)	(2.931)	(0.168)	(2.906)
4-yr. college	0.24	20.52	0.79	66.79	1.16	52.61
	(0.025)	(1.866)	(0.026)	(2.362)	(0.206)	(2.362)
Other	0.62	38.70	1.31	81.40	2.93	87.83
	(0.070)	(3.567)	(0.026)	(2.853)	(0.327)	(1.423)